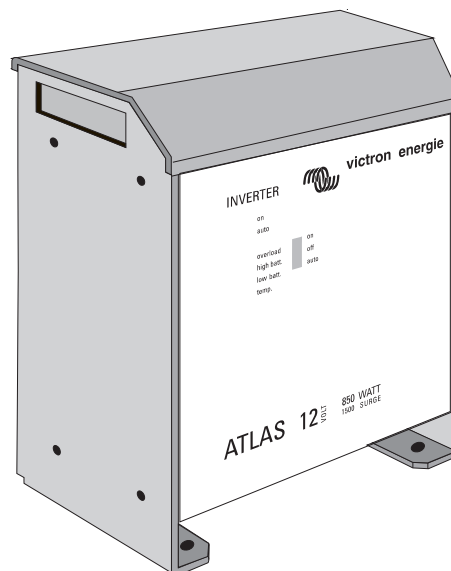




**USER MANUAL
GEBRUIKSAANWIJZING
GEBRAUCHSANWEISUNG**

Victron Atlas 12/850





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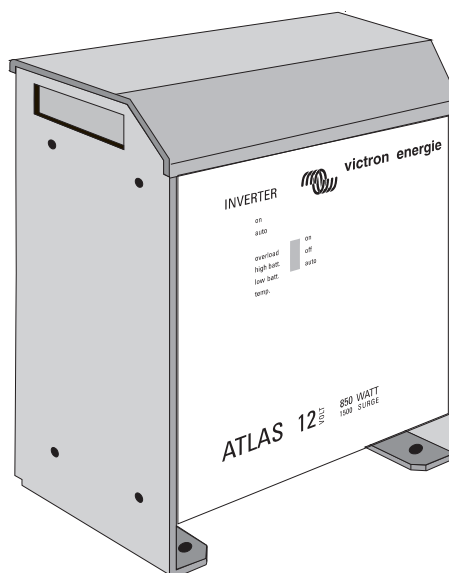
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ENGLISH

USER MANUAL
Victron Atlas 12/850



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INTRODUCTION

Victron Energie has established an international reputation as a leading designer and manufacturer of power systems. Our R&D department is the driving force behind this reputation as it is continually seeking new ways of incorporating the latest technology in our products. Each step forward results in value-adding technical and economical features.

Our proven philosophy has resulted in a full range of state-of-the-art equipment for the supply of electrical power that meets the most stringent requirements.

Victron Energie systems provide you with high-quality AC supplies in places where there are no permanent sources of 230-Volt AC power.

An automatic stand-alone power system can be created with a configuration comprising a Victron Energie inverter, battery charger, mains manager (if required) and, last but not least, batteries with sufficient capacity.

Our equipment is suitable for countless situations in the field, on ships or other places where a mobile 230-Volt AC power supply is indispensable.

Victron Energie has the ideal power source for all kinds of electrical appliances used for household, technical and administrative purposes, including instruments susceptible to interference. All of these applications require a high-quality power supply in order to function properly.

Victron Atlas 12/850

This manual contains directions for installing the Atlas inverter model 12/850. It describes the functionality and operation of the Atlas, including its protective devices and other technical features.

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1. DESCRIPTION

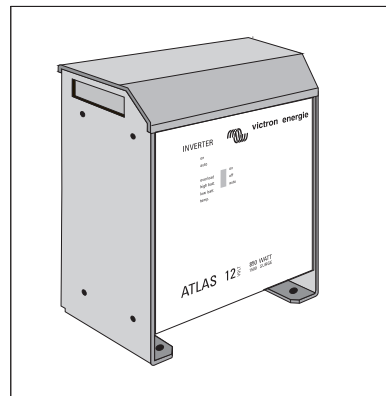
1.1 General

All Victron Atlas inverters are tested for proper functioning, before leaving the factory. They are packed in shock-absorbing polystyrene and packed in sturdy cardboard boxes for secure transportation.

IP21 =
protection against materials larger than 12 mm (for example a finger) and protection against vertically descending water-drops (condensation).

Watt =
unit of power
Volt =
unit of voltage
Volt_{rms} =
root mean square (effective value of alternating wave)
Hertz =
unit of frequency

The Victron Atlas 12/850 is housed in a robust aluminium cabinet (IP21) suitable for floor or wall mounting. The AC output terminals, the DC battery terminals and the terminals for a remote control panel can be reached by opening the front of the cabinet and the dripshield with a screwdriver.



1.2 Victron Atlas

The name ATLAS refers to an inverter. The designation "12" stands for the input voltage of 12 Volts. The designation "/850" refers to the continuous output power of the inverter, 850 Watt. The Atlas inverter converts a 12Vdc voltage into a trapezoidal AC voltage of 230 V_{rms} (-/+ 5%), 50Hz. A maximum short-duration power can be delivered for about three seconds.

	continuous power	maximum-power
Atlas 12/850	850 Watt	1500 Watt

Almost any electric or electronic device powered by a 230 V_{AC} (50 Hz) supply may be connected to the output of the Atlas.

1.3 Description

The inverter converts a direct current of 12 V into an alternating current of 230 V, 50 Hz. With the Atlas switched on (i.e. switch set to “on”) the inverter’s own no-load power consumption is 6 Watt.

A maximum efficiency of approximately 94% is achieved through the use of powerfet’s.

The Atlas has a “stand by” facility, as standard. It is activated by setting the switch to the “auto” position. This switches the inverter to a lower stand-by voltage at times when the external equipment does not require power. This limits power consumption to 2 Watt. The inverter operates when a load is detected. Substantially reduced power consumption is achieved when there are intermittent loads. The sensitivity of the AES (Automatic Economy Switch) can be adjusted, for more information see section 4.4 “Adjustments”.

AC =
Alternating
Current.

DC =
Direct Current.

**intermittent
load** =
a load regularly
switched on and
off automatically
in equipment such
as refrigerators or
electric heaters
with thermostats.

AES =
Automatic
Economy Switch

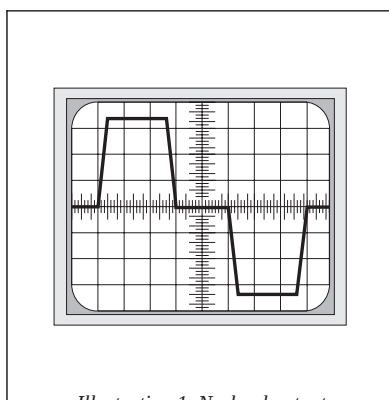


Illustration 1. No-load output
voltage during “on” mode

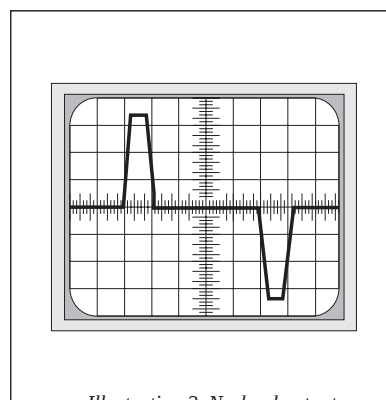


Illustration 2. No-load output
voltage during “auto” mode

2. PROTECTIVE DEVICES

The Atlas inverter is extremely reliable thanks to numerous built-in protective devices. Descriptions of these devices are given below.

2.1 Short-circuits

The Atlas 12/850 inverter output is protected against short-circuiting. The short-circuit current is 2.5 amp.

short circuit current = current supplied when a short-circuit on the output occurs.

In this condition the output voltage approaches 0 V. Once the short-circuit has been rectified the inverter immediately resumes normal operation. This eliminates the need to fit a fuse in the inverter's output circuit.

2.2 Maximum power

There is an upper limit to the power which the inverter can deliver. This level, which is limited electronically, can be delivered for 3 seconds.

	continuous power	maximum-power
Atlas 12/850	850 Watt	1500 Watt

2.3 Overload

If the inverter is subjected to a high load, it may reach the critical limit (approx. 1000 Watt) and the overload protection will be activated.

LED = Light Emitting Diode

The overload protective device fitted to the Atlas 12/850 works as follows:

- ☐ If the critical limit is reached, the red "overload" LED lights up. After 3 seconds, the inverter limits the power to ca. 1000 Watt.
- ☐ If the load drops below the critical limit within 3 seconds, the inverter continues working normally and the "overload" LED goes out.
- ☐ When, after 3 seconds, the inverter has reached the limit of its capacity and the load then drops below the

- critical limit, another 3 seconds must elapse before the inverter again delivers full power.
- ❑ If the inverter is overloaded for too long, the thermal protection device will switch off the inverter after a few minutes.

2.4 Temperature

The temperature of the electronic components is measured continuously. The inverter switches off before the temperature reaches an unacceptably high level due to short-circuiting, overloading or excessive ambient temperatures. The red “temperature” LED lights up when this situation occurs. The inverter restarts automatically once the temperature has dropped to an acceptable level.

input voltage =
DC voltage
delivered by
batteries

output voltage =
AC voltage
delivered by the
Victron product

2.5 Low input voltage

The inverter switches off if the input voltage is too low. This input voltage limit is ± 10 V. The inverter restarts when this voltage exceeds ± 11 V.

2.6 High input voltage

The inverter switches off if the input voltage is too high. The inverter switches off if the input voltage rises above ± 17.3 V and restarts once the input voltage has dropped below ± 16.3 V.

The Atlas 12/850 is NOT protected against reversed polarity (i.e. “+” connected to “-” and “-” connected to “+”). Accordingly, please follow carefully the instructions which are given in section 3.4.3.

3. INSTALLATION

3.1 Materials required for 230 V connections

- ☐ Two mains leads, 2.5 mm², maximum length 6 m;
- ☐ Screwdriver No. 1 (to connect the 230 V cables);
- ☐ Open-end spanner M6.

3.2 Location

Install the inverter in a dry area with good ventilation.

NOTE:

High ambient temperatures will reduce output power, impair efficiency and shorten working life (see “SPECIFICATIONS”).

There are holes in the bottom and rear of the cabinet for floor or wall mounting. For the dimensions, refer to section 7 “Drawings”, drawing number AT04014E, page 24

The Atlas is suitable for mounting either on a wall or on a horizontal surface. Ensure that there is adequate ventilation, to allow for natural cooling. The front of the Atlas is detachable. Make sure you will have easy access to the inside of the unit, from the front, after installation.

Keep the distance between the Atlas and the battery(ies) as short as possible.

3.3 Battery cables

The wire diameters of the battery cables are suitable for continuous loads and peak loads.

Distances to the battery(ies)	cable diameter:
0 - 1.5 m	16 mm ²
1.5 - 6 m	25 mm ²

Cable lengths of more than 6 meters are not recommended. Avoid contact resistances by tightening up all connections.

3.4 Connections

3.4.1 Earthing

The ground connection (earth protection conductor) for the mains is provided on the AC-terminal block (illustration 4). The circuit is functional only if the cabinet is connected to earth. An M4 earth screw is fitted in the bottom of the cabinet. Connect the cabinet earth terminal to earth.

The earth for vessels is the hull or earth plate; for motor vehicles it is the chassis.

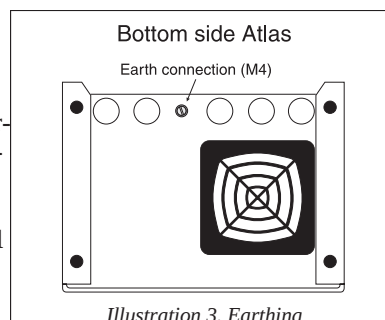


Illustration 3. Earthing connection.

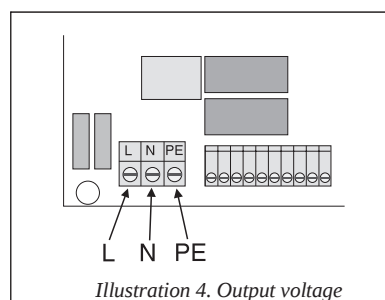
3.4.2 230 V_{AC} output

The terminal block is located on the PCB.

The 230 V external equipment must be connected to the inverter by means of a three-wire cable (see illustration 4).

Use a cable with a flexible core and a wire diameter of 1.5 mm² to 2.5 mm². The connection arrangement of the output terminal block is:

Phase:	Brown or Black wire to:	L1
Neutral:	Blue wire to:	N
Earth:	Yellow/Green wire to:	PE



The inverter will be damaged if another alternating current (e.g. from a generator) is connected to the 230V output.

output terminal block =
output (delivery
230 Volt)

input terminal block =
input (acceptance
230 Volt)

remote connections =
connections for
remote control

3.4.3 Battery

The functioning and working life of equipment and batteries depend on the battery connections being made correctly. Between the battery and the Atlas there is a circuit with a low voltage and high current. Resistance decreases accordingly as cables become shorter and thicker. The combined resistance of the two cables must not exceed 4 milliohms.

As previously explained (in section 2.6) the inverter is not protected against reversed polarity. The following procedure should therefore be used:

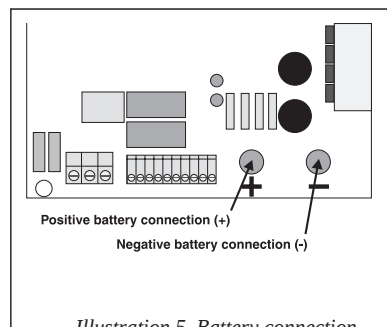
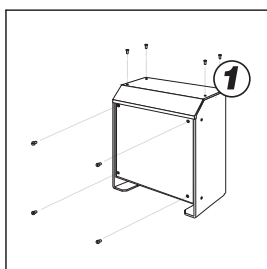
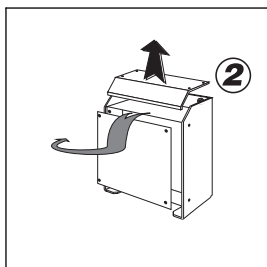


Illustration 5. Battery connection.



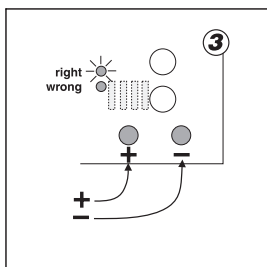
step 1

Unscrew the four screws of the dripshields and the four screws on the front of the cabinet.



step 2

Carefully take off the dripshield and slide the front of the cabinet to one side.

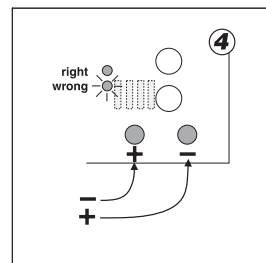


step 3

Satisfy yourself that the four fuses (30 Ampere) have been disconnected. You will find the fuses with the other connection material. Connect the battery cables; the “+” (red) to the left connector and the “-” to the connector on the right. If the connections have been made properly, the green LED (“right”) will light up.

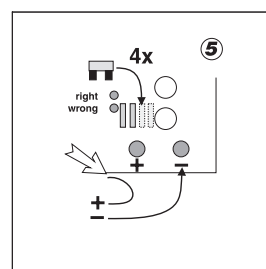
step 4

If the red LED (“wrong”) lights up, this means that the battery cables have been connected incorrectly. In this event, immediately disconnect the battery cables. Switch the cables over, then reconnect them.



step 5

When the green LED “right” is lit up, the four fuses of 30 ampere can be fitted. To this end, disconnect the plus pole of the battery cable. Fit the fuses, then reconnect the plus pole again.



step 6

Check that the connections have been sufficiently tightened. Use the M6, open-end spanner.

Ensure that all switching between different 230 V_{AC} power supplies (e.g. shore generator) takes place by means of DOUBLE-POLE switches. Otherwise the Atlas may be damaged.

double-pole switching
switching by means of a relay which has two separate contacts, i.e. one for phase and one for the neutral wire

3.5 Potentiometers

Potentiometers are adjustable resistors. Turning the screw increases or reduces the values associated within the potentiometer.

These values may concern matters such as voltage, frequency or switch-on sensitivity. The screw must be turned by means of a screwdriver (No. 0) and sealed with nail polish (see illustration 6).

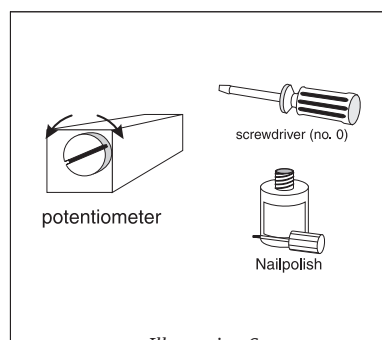


Illustration 6

4. START-UP

4.1 Operation

The switch and LEDs of the inverter are located on the front of the Atlas (see illustration 7)..

inverter		description
on	=	switched on
auto	=	automatic (AES)
overload		overload indication
high battery		high input voltage
low battery		low input voltage
temperature		temperature indication

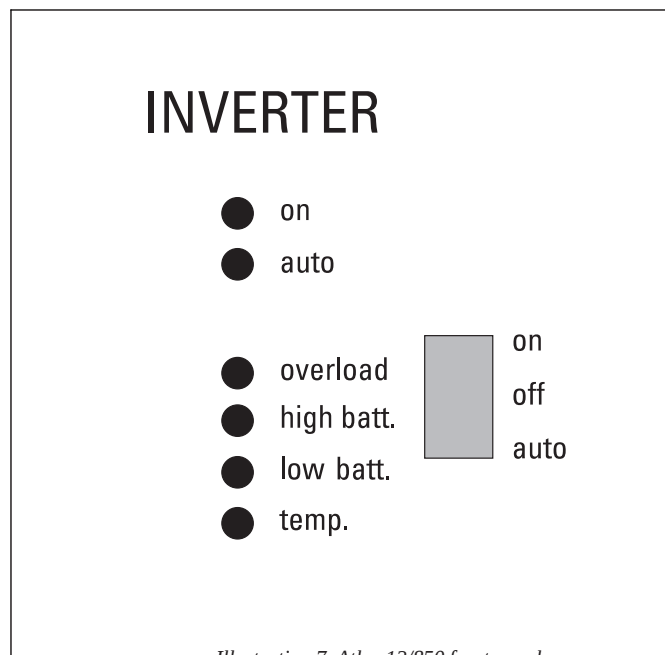


Illustration 7. Atlas 12/850 front panel.

4.2 “On” position

Start the inverter by setting the “inverter” switch to the “on” position. The LEDs “on” and “load on inverter” light up if an output voltage is present.

4.3 “Auto” position

When the inverter is in the “auto” mode (bottom position of the switch), the yellow “auto” LED lights up to indicate that the AES has been activated. Refer to the fault tracing list if this does not occur. The inverter starts as soon as the load at the output exceeds 9 Watt. The yellow “auto” LED goes out and the green “on” LED lights up. The inverter switches back to the “auto” mode automatically as soon as the load is switched off. The yellow “auto” LED lights up again.

4.4 Adjustments

Open the cabinet by unscrewing the four screws of the drip-shield and the four screws on the front, which can then be removed. All the adjustment points are on the printed circuit board of the inverter. The PCB has three adjustment points (see illustration 8).

4.4.1 Frequency

The frequency is set to a standard value of 50 Hz although this can be altered by turning potentiometer P1 to the left (“-”) or to the right (“+”). This can be measured with a digital frequency meter. Please note that analog frequency meters often give incorrect readings.

4.4.2 Output voltage

The output voltage is set to a standard value of 225 Vrms at a load of 850 Watt and an input voltage of 12 V. The unloaded output voltage is approximately 232 Vrms. The output

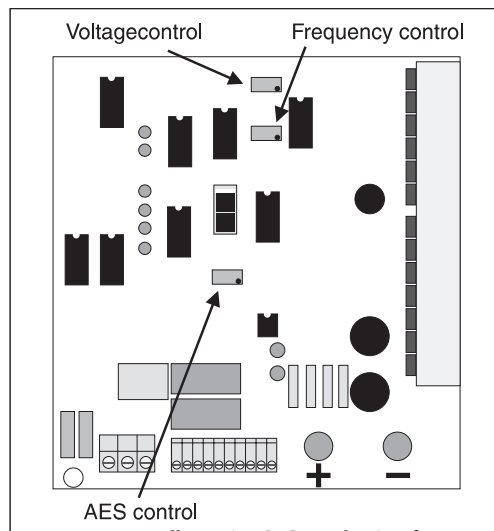


Illustration 8. Control points for the Atlas 12/850.

voltage may be adjusted by turning potentiometer P2 (top right) to the left (“-”) or to the right (“+”).
For the accurate measurement of the output voltage you will need a true - RMS multimeter or a moving iron voltmeter.

4.4.3 Switch-on sensitivity on “auto”

If the inverter fails to start when the external equipment requests power, the AES sensitivity may be increased turning potentiometer P3 (in the centre of the PCB) to the right. Check whether the inverter returns to “auto” once the external equipment has switched off.

4.5 High temperature

The “temperature” LED lights up if the FETs and/or the ring core transformer become too hot as a result of a short-circuit at the output, unacceptably high ambient temperatures or prolonged overloading. Also refer to section 2.4.

4.6 Overload

The “overload” LED flashes if the inverter is subjected to unacceptable overloading. This automatically switches off the inverter. The inverter restarts once the load has reduced and the electronics have cooled down. Also refer to section 2.4.

4.7 High/low battery voltage

If the “input” LED or “input” LED lights up after the Atlas inverter has been switched on, there may be a problem with the battery voltage. It may be too high or too low. The inverter switches off and will restart once the input voltage has risen or dropped sufficiently. Also refer to sections 2.5 and 2.6. Check the voltage by means of a voltmeter.

4.8 Remote control

A remote control panel may be fitted to switch the inverter on and off and to read out the LEDs. A closed switch means the inverter is switched on

4.9 Maintenance

The Atlas does not require any special maintenance. It is advisable to check the electrical connections periodically (once a year). Keep the inverter as dry and clean as possible.

5. FAULT TRACING LIST

5.1 General

The following tables will facilitate the rapid tracing of the most common types of faults.

Before performing checks on the inverters you must assure yourself that:

- ☐ all 12 V external equipment is disconnected from the batteries
- ☐ bear in mind that some equipment (such as certain TV sets, video recorders, audio equipment, measuring instruments and navigation equipment) requires sine-wave voltage in order to function correctly. Victron Energie supplies its series of Phoenix inverters with powers of 350 Watt to 1500 Watt for this type of equipment.

The fault tracing tables assume the following phenomena:

- ☐ the inverter does not start;
- ☐ the AC output voltage is too low;

5.2 The inverter fails to start

step 1

Set the “inverter” switch to the “on” position and check whether the green “on” LED lights up. Go to step 2.

step 2

The following may occur:

- ☐ The green “on” LED and the “overload” LED light up (the Atlas might produce a “buzzing” noise); go to step 3.
- ☐ The “battery low” LED lights up; go to step 4.
- ☐ The green “on” LED does not light up; go to step 9.

step 3

Remove the load from the AC output and check whether the “overload” LED goes out when the inverter is switched on. If it does not, go to step 9.

step 4

Check the input voltage of the battery(ies) on the terminals of the Atlas. The input voltage should be between the following two values:

If the input voltage is not between the minimum and maximum values, go to step 5. If the input voltage is correct, go to step 7.

step 5

Check whether the 12 V connecting cables are properly connected and the wires are of a sufficient diameter. Rectify the situation if the connecting cables are not properly connected or the wire diameters are not in conformity with the specifications. If this action does not solve the problem, go to step 6.

step 6

The batteries must be charged. Go to step 7 if the batteries have been sufficiently charged or recharged but the inverter does not start.

step 7

Check whether the plus (“+”) and minus (“-”) of the battery(ies) and the Atlas correspond, if so go to step 9. If the connections do not correspond, go to step 8

step 8

Reconnect the battery cables correctly. If the inverter does not work correctly now, restart the fault tracing procedure.

step 9

Contact your Victron Energie dealer to have the Atlas repaired.

5.3 The AC output voltage is too low

step 1

If you have determined with an RMS voltmeter that the AC output voltage is too low, go to step 2.

step 2

Turn potentiometer P2 (see section 4.4 “Adjustments”) to the right and check whether the voltage returns to the normal value. If it does not, go to step 3.

step 3

Contact your Victron dealer to have the Atlas repaired.

6. SPECIFICATIONS

6.1 Input

Nominal input voltage:	12 V _{DC}
Input voltage range:	10 -17.25 V _{DC}
Voltage ripple:	maximum 5% RMS
Nominal input current:	85 amp
Maximum input current:	150 amp
No-load in “auto” mode:	2 Watt
No-load in “on” mode:	6 Watt
Inputfuses	4 x 30 A (carfuse)

6.2 Output

Output voltage:	230 VAC ±5%
Frequency:	50 Hz; ±1 Hz
Waveform of output voltage:	Trapezoidal
Power factor:	0.9 capacitive to 0.4 inductive
Power at 20°C:	850 Watt, power factor 1
Power at 30°C:	700 Watt, power factor 1
Switch-on behaviour:	The inverter can start under any load conditions. The nominal output voltage is reached in 50 msec.

6.3 Automatic Economy Switch (AES)

Switch-on:	9.5 Watt
Adjustable sensitivity:	2-17 Watt
Switch-off:	4.5 Watt
Test voltage on “auto”:	110 V _{rms} 50 Hz
Efficiency:	94% (maximum) 83% (full load)
Dynamic stability:	Maximum surges of 10% when switching on and off at 50% nominal load. Recovery time is ½ period.

6.4 Protection

Overload protection:	The delivered power is limited electronically to: 185% (12 Volt battery) of the continuous power at the nominal input voltage.
Short-circuit protection:	The output is short-circuit proof. The short-circuit current is 2.5 Arms.
Ambient temperature protection:	Sensors measure the temperature of critical components. The sensors switch off the inverter if the temperature on the FETs rises above 75°C and/or the transformer temperature rises above 140°C. The inverter restarts automatically after the components have cooled down.
High/low input voltage protection:	The inverter switches off automatically at values above 17.25 V _{DC} and below 10 V _{DC} .

6.5 Standards

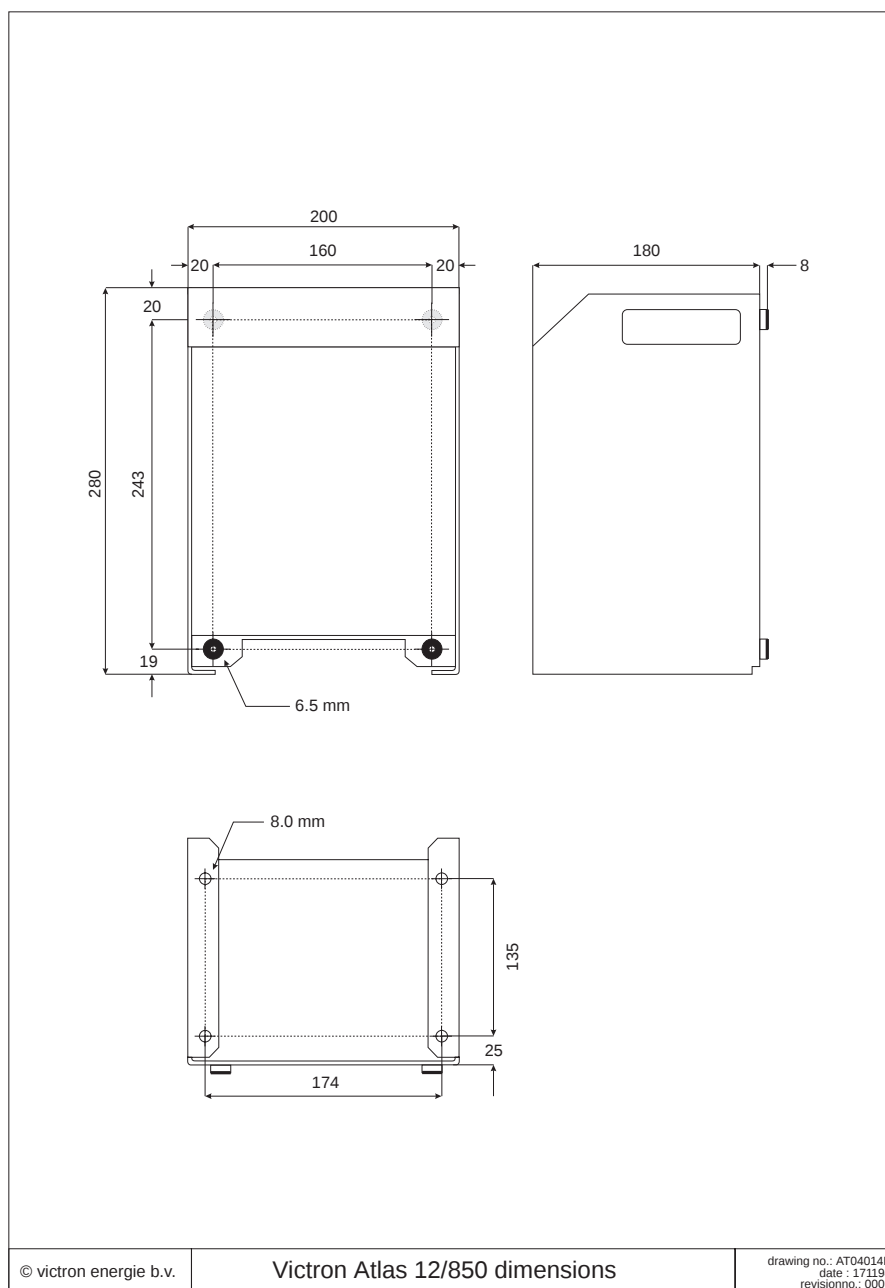
EMC: Electro-magnetic compatability according Council Directive 89/336 EEC	
Emission	EN 55014 (1993) EN 60555-2 (1986)
Immunity	EN 50082-1 (1991)

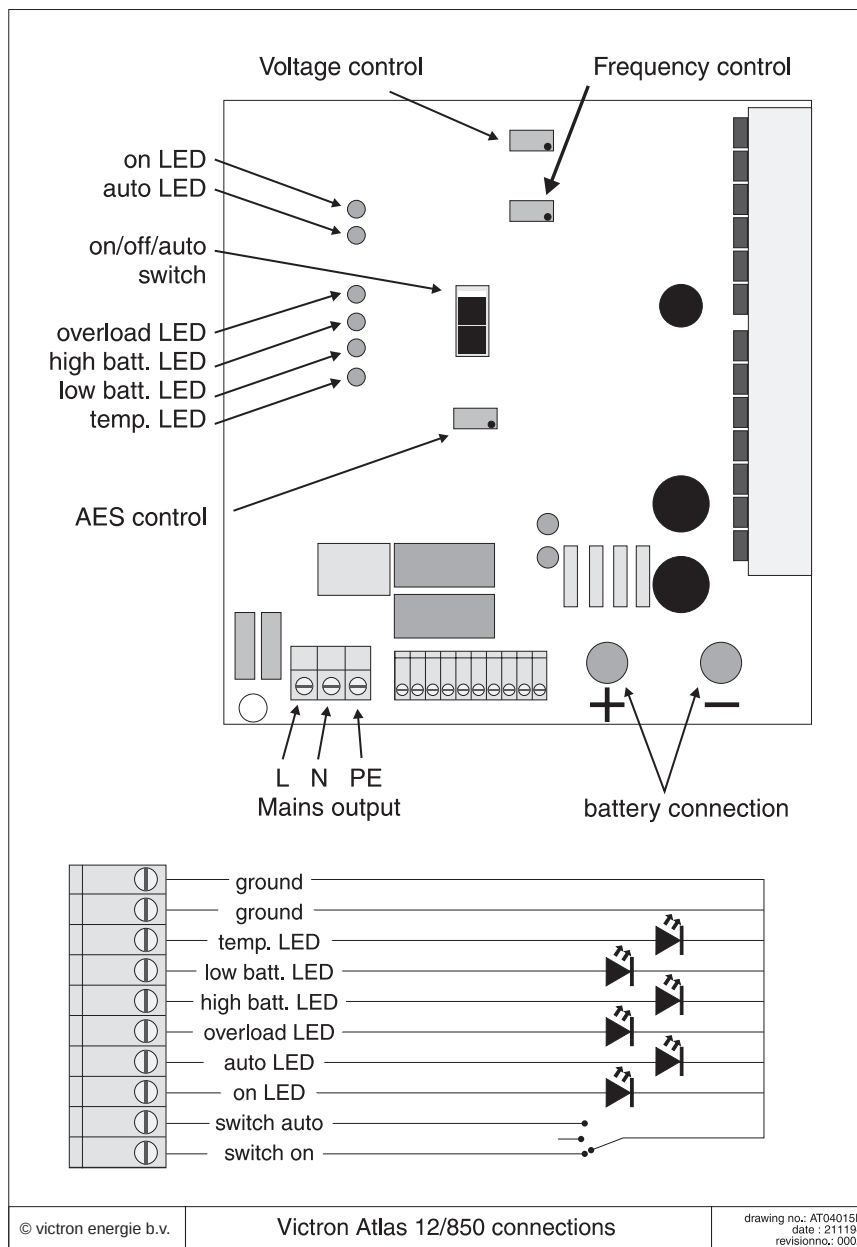
6.6 Mechanical data

Noise level:	40 dB(A)
Cabinet:	Aluminium, resistant to seawater
Protection:	IP21
Colour:	Blue (RAL 5012), epoxy
Dimensions (H x W x D):	280 x 200 x 188 mm
Weight:	9,5 kg
Connecting points:	
Output	230 VAC terminals (2.5 mm ²)
Input 12 VAC:	M6 bolts
Cooling:	forced air cooling
Relative humidity:	95% (maximum)

7. DRAWINGS

Atlas 12/850 cabinet dimensions	24
Atlas 12/850 connections	25





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Follow proper safety practices. If in doubt, consult a professional RV technician.